Report of Rocky Mountain Conference of Entomologists

August 20 - 25, 1 9 2 3

The first meeting of the Rocky Mountain Conference of Entomologists was held at Pingree Park, Colorado, at the forestry Cabin of the Colorado Agricultural College the afternoon of August 20 at 2.00 p.m., with 16 entomologists in attendance. Two others arrived later. The total number of entomologists and visitors was 40. The meeting was opened by Mr. List who spoke of the absence of Dr. Gillette and how much it was regretted by those in attendance. The meeting being entirely informal in character, most of the time was given up to planning for future sessions. Mr. Wakeland suggested that the morning be devoted to hikes or fishing, formal papers being given in the afternoon, and the evening program in the nature of a "round table". The suggestion met with unanimous approval and a committee was chosen to arrange for the programs, consisting of Mr. List, Dr. Drake and Dr. Smith. Mr. Jones gave an idea of the various trips in the vicinity of the camp, also the hours for meals.

The following registered at the camp during the week:

Walter H. Wellhouse.....Ames, Iowa
E. A. Pearson.....Kansas City, Mo.
Carl J. Drake.....Ames, Iowa
J. H. Newton.....Paonia, Colo.
Mrs. J. H. Newton.....Paonia, Colo.
C. L. Corkins.....Laramie, Wyo.
Mrs. C. L. Corkins..... " "
Wm. P. Yetter, Jr.....Grand Junction, Colo.
Anna Maude Lute.....Ft. Collins, Colo.
Miriam A. Palmer..... " "
Asa C. Maxson.....Longmont, Colo.
Mrs. A. C. Maxson..... " "
John L. Hoerner.....Ft. Collins, Colo.
Mrs. J. L. Hoerner..... " "
Newton Boggs.....Ft. Collins, Colo.

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Roger C. Smith.....Manhattan, Kansas
John W. Scott.....Laramie, Wyo.
Mrs. J. W. Scott..... " "
A. L. Lovett.....Corvallis, Oregon
Geo. M. List.....Ft. Collins, Colo.
Mrs. G. M. List..... " "
R. L. Webster.....Fargo, No. Dakota
Claude Wakeland.....Idaho
Laura M. Wakeland..... "
George Boyd.....Ft. Collins, Colo.
C. R. Jones..... " "
Stewart Lockwood.....Billings, Montana
A. A. Edwards.....Ft. Collins, Colo.
L. M. Taylor..... " "
Joseph A. Rogers.....Ft. Sill, Okla.
Chas. A. Lory.....Ft. Collins, Colo.
James B. Ryan.....
Roud McCann
Lois McCann
Jordan McCann
Bernice McDonald
Mrs. M. E. Reed
Harold Jones.....Ft. Collins, Colo.
Anna T. Baker..... " "
Dorothy Maxson.....Longmont, Colo.
Mrs. C. R. Jones.....Ft. Collins, Colo.

The meeting then adjourned for the gathering of fire wood, making of beds, etc., etc.

Miss Palmer was the speaker for the evening session, and gave a most interesting talk on Lady Beetles, illustrated by blackboard talk and charts. From the genus ADALIN she had selected five species, Malanopleura, Bipunctata, Coloradensis, Annectans and Humeralis, and showed the results of mating and cross-mating with relation to the Mendelian law. After an informal discussion, the evening meeting adjourned.

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manager of contest; Fly casting contest, Mr. Maxson, chairman; Judges of fishing contest, Misses Lute and Palmer; Entertainment, Mrs. Newton, chairman, Miss McDonald and Mr. Yetter. Committee on resolutions and nominations, Mr. Lovett, chairman, Messrs. Webster and Wellhouse.

The first paper was by Dr. R. C. Smith of Manhattan, Kans., who spoke on Alfalfa Insects in Kansas. His address was based on work done under Project 116 - Alfalfa Insects. The first group touched upon was that of the clover hay worms. These insects injure the hay in stack, especially in the bottom, eating the leaves, depositing a large amount of excrement and rendering the hay unfit for stock food. The clover hay worm is now general in the state. The moths deposit eggs in the soil and the larvae go to the stack bottoms. The larvae may be killed by burning the old bottoms. Much injury is caused when new hay is put on old stacks or old stack bottoms.

The Fall Army Worm occurred as a large outbreak in Kansas in the fall of 1920. This insect is thought not to over-winter in Kansas, but flies north from the Gulf states.

The first outbreak of the Pea Aphis was in the spring of 1920. This over-winters in alfalfa fields. It collects on stems and leaves in large numbers, causing the leaves to be stunted and sometimes plants are killed. There was no outbreak in 1922, but in 1923 there was a severe outbreak in the Caw valley. The insecticides tested were tobacco dusts, calcium cyanide and talc, and calcium cyanide and lime.

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Clover Leaf Weevil. This insect is apparently increasing in number. It is numerous in the low lands and shows up early in the spring. It is ordinarily held in check by a fungous disease.

Grasshoppers are apparent each year, with outbreaks in localities.

Garden Web Worm. There was an outbreak of the webworm during 1923. The chief injury occurred in potato patches and in fields of young alfalfa. One of the surprising things that developed in connection with this insect was the very large number of moths that developed in the third generation with no egg masses. The control method suggested was the spraying of fields about the border when ready to be cut, so that the insect could not spread.

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An informal discussion followed this paper.

Mr. Claude Wakeland of the Idaho Experiment Station, had a paper on New Developments in Alfalfa Weevil Control. Mr. Wakeland told of six one-acre tracts which were being treated by two sprayings. The spray is to be applied at the height of the hatching season which is about 3 weeks before the first cutting. In Idaho it was found more feasible to have a double, rather than a single spraying, as compared with the single spray in Colorado. Two sprayings are necessary to control the alfalfa weevil in southwestern Idaho, both on the first crop.

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Spraying was found preferable to dusting, which method is yet in the experimental stage.

Mr. J. H. Newton, of the Colorado Experiment Station, gave a talk on the Control of the Alfalfa Weevil in Colorado. The method used for the control of this insect is the one-spray method. The weevil first appeared in Colorado in 1917. Since that time the spread of the weevil in western Colorado has been rather erratic. Most of the western states are concerned with the spread of this pest. The weevil first made its appearance in the orchard-producing section rather than in the alfalfa field. The most serious outbreak was in 1919 in Delta County. Mr. Newton described the life-history of the weevil and its manner of development. During the last two seasons the injury has been very slight, and it has been difficult to find suitable fields for experimental work. The dusting work for the control of this pest, which has been carried on in co-operation with George I. Reeves, U. S. Bureau of Entomology, Salt Lake City, Utah, and the Idaho experiment station, is still in the experimental stage.

Mr. E. A. Pearson, of George B. Gordon Company, Kansas City, gave a short talk on arsenical poisons. He also touched upon the co-operation between scientific investigators and commercial concerns relative to improving certain insecticides and the possible reduction of prices, emphasizing that the object of science and commerce was each to serve the greatest number in the best possible way.

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The evening meeting on Tuesday was held about the log fire in the living room of the main cabin. Mr. Lovett, of the Experiment station of Oregon, gave a short talk on the European Earwig in Oregon. This insect first made its appearance in the United States in 1911 at Newport, R. I. It appeared in Oregon in 1916. It is an insect that is a serious household pest and attacks ornamental plants, small fruits and vegetables. Property values in the infested sections have greatly depreciated. The insect burrows into the strawberry fruit, attacks garden plants and all food stuffs, either in the garden or home. In size it is about as large as a small cockroach. The female and eggs withstand the winter, the males dying off. The eggs are deposited from two to six inches below the surface of the ground. Poison bran mash is used in controling the insect, the following formula having proven most effective:

Sodium fluoride.....12 ounces
Molasses..... 2 quarts
Wheat bran.....12 pounds
Water..... 6 quarts

Twelve pounds of the mash is sufficient for one city block. In 1923, an extensive campaign was put on in Portland, where the insect had rapidly increased within two years. A native earwig, which is also present, is not proving to be a menace in any way.

After Mr. Lovett's talk, Mrs. Newton, who was in charge of the entertainment for the evening, arranged a most amusing series of songs in pantomine to be guessed by the audience. This was followed by community singing and the meeting adjourned. (Dr. Webster called for more bedding).

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Dr.Wellhouse was chairman of the morning meeting on Wednesday, the 22nd.

The first paper was by Dr. R. L. Webster of Fargo, N. D., on "Bee Keeping in North Dakota". In the course of his remarks Dr. Webster brought out the fact that the northern country was especially favorable to bee production because of the excessive amount of nectar produced. The cool, clear nights are favorable for the change from starch to sugar, at temperatures somewhat lower than normal. Cool nights are characteristic of the North Dakota climate. Abundant nectar secretion, however, is not sufficient; the bees should leave the hives. The long and bright days during the honey flow are especially favorable. Sweet clover is mainly responsible for the large honey crops in North Dakota. The plant does well in that state. It withstands the drought and is a very important forage plant. One hundred forty thousand acres of sweet clover are now planted for pasture and hay. About the middle of June in North Dakota, the sweet clover honey flow comes in. Federal statistics for 1922 showed that North Dakota produced an average of 150 pounds per colony. Reports from thirty-five beekeepers in 1922 showed an average of 151 pounds per colony, while some keepers reported as much as 400 pounds. The Red River valley is favorable to bee production. West of the Missouri River there are practically no bees. Low river flow and very little irrigation are contributing factors.

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[illegible] were very little [illegible] [illegible].

Quite [illegible], this or [illegible] temperature [illegible]
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very largely alfalfa and sweet clover, with a high sugar and a low dextrine content. The winters are long and cold, but the bees give little trouble until spring. A law was passed at the last legislature to the effect that every package of live bees entering the state should be accompanied by a certificate that the brood is free from disease. Package bees built up from a 2- pound package will compete with a full hive wintered over. Most of the beekeepers are limited, for the most part, to 100 hives of bees. There are practically no large commercial beekeepers in the state. The prospects for this industry in North Dakota are very bright. Given a man who studies his bees, and the location, plus business ability, an opportunity is offered which can scarcely be equaled.

Dr. Webster's paper was followed by a talk by Mr. Newton Boggs on "Some Problems of Beekeeping in Colorado". Colorado can be divided into six beekeeping regions: Platte Valley, Arkansas Valley, San Luis Valley, San Juan Valley, Colorado River basin, and an undeveloped region in the northwestern part of the state. The higher the altitude, the faster the nectar secretion, but the shorter the season. As in North Dakota, the long days and cold nights are favorable for honey. In Colorado there are about 120 and 125 thousand colonies of bees, with an output of some 125 carloads annually. The Platte River valley is a heavy producing section. In Colorado there is a Honey Producers' Association which handles much of the output. In the Arkansas Valley there are several large bee producers, one dealer in Otero County having 2400 colonies of bees. In the San Luis valley there are few bees as yet, altho conditions

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the San Luis valley there are few bees, as yet, altho conditions

are favorable. The elevation is about 7500 feet. Honey flow starts about the middle of July and the season ends about the middle of September.

The San Juan basin is one of the best sections for honey production. The seasons are long and mild; the elevation about 6000 to 7500 feet. The great drawback to this region is the question of transportation, as it costs $300 to get a carload of honey to Denver. In the Colorado River section, four counties produce between 45 to 50 cars annually. In this section the variation in altitude gives almost a continuous bloom of alfalfa within working distance of the bees.

The vicinity of Steamboat Springs is a good locality for honey raising, but is as yet undeveloped. The honey flow begins about the middle of June and lasts until frost. Alfalfa is the chief source. Four brood exists in Colorado, but it is kept under control by large beekeepers.

A short discussion followed these papers.

Mr. C. R. Jones, of the Colorado Experiment Station, gave a short talk on Syrphus flies. The syrphidae, one of the largest families of the dipterous group, have a large variety of forms. Considerable trouble is experienced in dealing with the larvae in determining the genus and species. The feeding habits and breeding of some varieties were discussed. In working up data for publication, Mr. Jones had established a new genus and 17 new species.

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Mr. H. W. Allen, of the Bureau Entomology, gave a report on the Mexican fruit fly. This insect is especially

native to old Mexico, but has worked its way up northward gradually. Its activities are confined almost entirely to bean plants, altho it does feed on other legumes. The insect has several generations; in the South as many as four. In Colorado it goes thru one complete generation, with a few completing second generation. It winters as adult, coming out in the spring, usually early in June, from the 5th. to 12th. At this time the early beans in the gardens are beginning to blossso and the insect prefers these to those planted later. The insect then commences to deposit eggs in masses on the leaves, averaging about 50 eggs to a mass. These hatch in six to eight days. The larvae cause the most injury. The period of the second generation is slightly longer. The greatest injury is done in August, when the larvae appear in the greatest numbers and at the same time with some over-wintering adults and some new adults.

Distribution in Colorado. During the last 15 to 20 years, the spread in north-eastern Colorado has been slight, the infestation being confined to the foothills region. Similar conditions exist southward down the mountain range, except in the Arkansas valley where it has spread eastward the entire length of the valley. This spread has been since 1916. On the western slope the spread has been northward along the foothills. Three new counties have become infested during the last three years.

In the West, the insect has been found in New Mexico, Arizona, Colorado, Utah and Wyoming.

In Colorado adults occur at from 3000 to 8000 feet altitude. Control work has been rather discouraging. Bean beetles resist

arsenic and the bean plant has little resistance. A spray is necessary which would not injure the beans and yet give protection. Arsenate of lead, arsenite of zinc, arsenate of calcium, and arsenate of magnesium have been used, with the best results from arsenite of zinc and arsenate of magnesium. Better results are obtained from liquid spray than from dusting.

In the evening the paper was given by Dr. J. W. Scott, head of the department of Zoology, University of Wyming, on "Infectious Enemia in Horses", with special reference to insect transmission. Enemia and swamp fever in horses has been known since 1843 and is a septicemic blood disease. The virus is still practically unknown. It is found in the blood, all of the organs of the body, and in several of the excretions of the horse. The virus is beyond the limits of microscopic vision. The first characteristic of the disease is a more or less regular or irregular recurrent fever, causing a very rapid loss of flesh. The disease is very obscure and hard to diagnose. Mortality is thought to be very high, yet some horses live for many years with the disease while others die very soon after having been attacked. It is somewhat similar to "flu" in human beings. The disease is infectious and not contagious and is prevalent from sea level to altitudes of 9000 feet. It runs from Texas to North Dakota, east to New York, and is found in the northwest territories, while occurring in several countries in Europe. The earliest cases noticed are found in the early part of the summer, increasing in number until fall. These rapidly diminished and no cases are detected in December. The disease can be produced in a well horse by

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feeding blood obtained from a sick one. The amounts of blood necessary to produce infection vary from 100 to 5000 c.c. The disease is essentially a pasture disease.

All previous experiments had dealt with internal transmission. In his work, Dr. Scott turned his attention to the matter of external transmission. Dr. Scott covered the results obtained by his experiments very much in detail, and showed that after many experiments it was found possible for the ordinary stable fly to transmit the disease from sick to well horses, if considerable numbers were present. In some fever cases, certain horses would drop a bloody secretion from the nostrils. This suggested the possibility that a virus was present in the nostrils. Two experiments were tried dealing with the nasal droppings. If once a horse has the virus in the blood, it always remains. Remedies are given to reduce the fever and many animals can be kept alive for years. Their condition, however, is similar to that of tuberculosis in human life and no anti-toxin has yet been found.

After this paper, the conference adjourned to the hill back of the lodge and enjoyed a bonfire, stunts, songs, and toasted marshmallows.

Thursday, the 23d. was more or less of a holiday. Some of the members made a trip to Hallet's Glacier, while others enjoyed fishing, collecting trips, hikes and games. In the evening Dr. Smith, of the agricultural college at Manhattan, Kan., lead the discussion on "The Teaching of Entomology to Students not Specializing." Dr. Drake presided. A letter from Dr. Gillette was read by Mr. List and was received with applause. In the course of his

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talk Dr. Smith asserted that the beginning course was the most important in any subject, entomology or otherwise. Fully three-fourths of the students taking an elementary course do not take any further courses in the subject. The subject should be carefully worked out in every detail. Several fundamentals relating to insects must be learned in a foundation course; if not learned there, the student will be at a disadvantage. As an outline, Dr. Smith gave the following:

(1) Certain facts of insect growth, metamorphosis and insect biology.

(2) Some definite ideas concerning the external anatomy of insects as the parts of the body, names and types of mouth parts, parts of legs and perhaps some knowledge of wing venation.

(3) Some definite ideas about the body systems of insects, e.g., respiratory with adaptations for aquatic life, digestive, etc.

(4) While the name of an insect is undoubtedly the least important fact about it, nevertheless it is necessary knowledge. Names serve as handles for the scientist. Names of orders and most important or most numerous families should be learned. Common names where they serve are to be preferred to binomials.

(5) A knowledge of the biological features of as many different insects as time permits. The emphasis and greatest part of time is, of course, spent here.

The problem is to give as much as possible to the student in one semester. Economic biology is a good feature in agricultural colleges. The leading farm pests and certain other well-known insects are the ones with which the students should deal. The course in entomology is now gradually changing from pure science to applied entomology. In the laboratory, certain life histories are studied. Dr. Smith thought that economic entomology

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(4) While the need of memorizing the local names of insects is not an important fact about it, nevertheless it is frequently necessary. Based partly on the local names, the most important or most common insects should be learned. Common names where they serve are to be preferred to binomials.

(5) A knowledge of the biological features of as many different insects as time permits. The emphasis and greatest part of time is, of course, spent here.

was important, but general entomology is the foundation upon which it must be erected. However, in agricultural colleges the economic side must receive attention. The problem in the laboratory is no less difficult. There is a question whether sometimes the morphological is not receiving more emphasis and the biological neglected, so that the student may turn away disappointed. Field trips are enjoyable and profitable. Notebooks should be kept with rough rather than minute drawings. This work is of value to the student for he understands what he is doing. To many, the enjoyment of the subject lies in the fact that they are a part of the great scheme of nature, and its study will bring them into harmony with nature. The study of entomology opens up a new field of knowledge to the student.

This paper was followed by a general discussion into which all entered. In Oregon, horticultural students in the sophomore year may take an advanced economic course. Mr. Lovett questioned the type of laboratory work given and was not satisfied with it. Among most workers more dependence is placed upon a visual knowledge of the group in comparison with an insect collection than upon looking up the species in the entomology textbook. More knowledge is to be had from visual experience than from book research. Much of many laboratory courses, in his opinion, was a waste of time. Principles rather than practices should be emphasized in the beginning course.

Professor Jones asked for opinions from different states. At the Colorado Agricultural College, all agricultural students have to take the general course in entomology. He disagreed with

Mr. Lovett about drawings of insects. The facts brought out in the drawings remained with the student and were of value to the special students in getting the important facts they must have.

Dr. Drake said that in Ohio an elementary course of three hours was given during the first semester; general first and economic last. He further emphasized the need of taking up the more important orders, then going into the economic side, with spraying and insecticidal work.

Dr. Wellhouse, of Ames, brought out that in that institution in the general course there was no laboratory period; two lectures a week and one hour which had been used as a demonstration period. During the latter period, there was placed on tables for the students to observe, first, something representing the various parts of the insect, labeled, then, the various orders of insect for the student to look over. Each student is required to make a rough sketch with general characteristics of insect or to write a description. During the two lecture periods, (which course is preceded by a genral course in zoology) elementary entomology is given,- a general study of metamorphosis with board drawings and models, followed by Sanderson's text book on the economic side. Dr. Wellhouse thought more elementary entomology and laboratory work are needed, especially for county agents. He had found that the students who run thru a key got on better later than those who had merely visual knowledge.

Mr. Lovell: Is the time spent to best advantage if spent wholly on drawings?

Dr. Wellhouse: That depends upon how the teacher goes at it. If a student can be kept curious, not telling things but asking

hour which had been used as a demonstration period.
During the latter period, there was placed on tables for the
students to observe, first, something representing the various
parts of the insect, labeled, then, the various orders of insect
for the student to look over. Each student is required to make
a drawing showing with general correctness of shape as well as
description. During the two lecture periods, (which course is
preceded by a normal course in zoology) elementary systematic
study,- a natural study of arthropods with their structure and
habits, followed by laboratory work in the usually also,
in. Optional courses elementary entomology and insect
rest are given, especially for those especial. We also have the
the Junior year but a few out of College last year and there
are not enough related courses.

Dr. Jacobs: Is the time spent on that course in proportion
nearly an equivalent?

Dr. Williams: That depends upon how the teacher puts it.
If a student can be kept working and talking about an insect

him questions, the time is well spent. The evolution feature is useless at that stage with the student. The student, however, should see one of each of the main types of insects, and about the only way is to describe it by drawing.

Dr. Webster: In many institutions the teaching of economic entomology is put upon a young instructor, not well informed or interested in the subject. I believe that the beginning course for agricultural students should be in the hands of the very best man of the department. It may be necessary to "pull off" a man from the Experiment Station or Extension departments. A knowledge of the state or county in which the student lives is a great help in getting in contact with the student. First-hand knowledge of local conditions is much better than book knowledge. The courses are likely to cover too much general knowledge instead of specific details. We can cut down a great deal but more emphasis should be placed upon some of the main economic principles. Dr. Webster believed in going over the main economic groups of insects. When illustration is necessary, get an insect fairly common and known to the students.

The discussion then resolved itself, temporarily, into the pros and cons of the need for county agents to have a thoro knowledge of entomology, both sides being favored.

Dr. Scott, of Wyoming, said: "I feel that the drawing work is important, but it is easy to have it become monotonous. In Wyoming the course in elementary zoology has a great deal of drawing. The object is to know the parts of an insect in their right proportions, as well as to have a knowledge of identification of forms and labeling them properly. The student keeps it in mind

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[illegible] respectively, as well as [illegible] and
name and explain them properly. The student cannot be induced

continuously because he wants his notebook to pass. The real object is to get the student to understand the insect in its larger relationship." Dr. Scott had found in his teaching that one of the best introductions for laboratory work in the study of any form was to begin with the living insect. The student had an interest in such an organism and its life habits, and was much more interested than in the study of any "mummified" insect shown by charts. Living material could be obtained from greenhouses suitable for class work. It is necessary to prove to the student that entomology is not a queer subject. If this is accomplished, much has been done. Dr. Scott favored cutting down laboratory periods and giving more lectures.

Mr. Corkins said that at Montana there was less laboratory work and more lectures were given. The elementary entomology is all given by lectures, and is proving to be of interest and very popular with the students.

Dr. Webster felt that the inclination is to teach entomology as a subject and not in relation to science.

The discussion was followed by a short address from Dr. Lory. He emphasized the need of all departments of an institution working together. In spite of the tendency towards specialization, no one head should be too zealous in getting a student to take up work in his particular department when he (the student) was better fitted for a general rather than a special course. "If I were confronted by the problem that you have in a general course in entomology I would say, "What are we going to do: what is the thing we must have in this course--essentials or nonessentials"? There must be kept in the student's mind the idea that no one man can get it all. He should keep an open

everything one feels should be done. In all general courses the thing we must do is to lay out the principles of the science and its necessary fundamentals; then drive home on those. The tendency is to make a specialist of a general student, and in chemistry and physics this same tendency exists. Every agricultural student should not have the highly developed mathematical knowledge of physics as is required by one highly specialized in that subject. A student with a well developed accuracy in observation and a well developed sense of accurate measurements can put this knowledge into use in other ways than merely in the course accentuating this phase.

Dr. Lory referred to the encouraging news from Dr. Gillette, thus closing his remarks for the evening.

Friday morning, August 24th. the meeting was in charge of Dr. Webster.

The report of the Committee on Resolutions, presented by Mr. Lovett, was read and unanimously adopted. The report of the Nominations Committee, also submitted by Mr. Lovett, presented the following nominations for the ensuring year:

Dr. C. P. Gillette, chairman.

Mr. George M. List, secretary.

The adoption of the report was unanimous.

Mr. List suggested that a vice-chairman from some other state be added to the above list. After some discussion it was moved by Mr. Lovett that "an addition be made to the list of officers by the office of vice-chairman." Carried. The nominations were made from the floor and finally resulted in the unanimous selection of Prof. Swenk, of the University of Nebraska, as

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the science and

as is required by one highly specialized in that subject.

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the University of Nebraska, as

vice-chairman, the temporary secretary being instructed to case one ballot.

The matter of time and place for the next meeting was brought up by Mr. List but it was decided to leave that to the committee above selected.

Mr. Jones suggested that the Conference leave in the lodge a list of names of all those present. Mr. Yetter was instructed to attend to the matter, obtaining all necessary signatures.

Dr. Drake gave a paper on "Hessian Fly Control in Iowa", basing his remarks very largely upon a bulletin on that subject issued by the Iowa Experiment Station. The first appearance of the fly in this country went back as far as 1789, but it did not reach Iowa until 1860. The main control work during the past year was carried on in the southern part of the state, being handled thru county agents, farm bureaus and wide newspaper publicity. In 1922 the damage done, based on county agents' estimates, was about $1,500,000. Indications were that it would be much less for 1923. The fly has two broods, spring and fall. The object of the experiment was to sow the grain so that it would not be above ground during the laying season of the insect in the fall. In 1922 there were three observation stations carried in different sections of the state, with daily reports to the Experiment Station at Ames. By means of radio, the reports could be broadcasted before the daily sheets were issued from headquarters. Iowa was fortunate in having a well developed county agent system, some 102 agents, well fitted to handle control measures.

The afternoon meeting was in charge of Mr. Lovett.

time and place for the next meeting was brought
by Mr. Light but it was decided to leave that to the committee
already selected.

Mr. Evans suggested that the Secretary have in the Minutes
a list of the names of all those present. Mr. Yetter was instructed
to attend to the matter, ensuring all necessary signatures.

Mr. Evans read a paper on "Insects Fly Control in Iowa",
dealing with remarks very largely upon a bulletin on that subject
issued by the Iowa Experiment Station. The first appearance of
the fly in this country went back as far as 1789, but it did
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estimates, was about $1,500,000. Indications were that it would
be more than for 1923. The fly has two broods, spring and fall.
In the fall, In 1922 there were three observation stations
operated in different sections of the state, with daily reports
to the Department during the season. By means of traps, the flies
could be investigated during the day. Some were optimistic in having a well developed
control method, even 100 traps, well fitted to handle
conditions.

Mr. A. C. Maxson, of the G. W. S. Company at Longmont, Colo., spoke on "Sugar Beet Leaf Hopper in Idaho" with special reference to the transmittal of the "curley top" disease. His remarks were based upon his experience in Snake River Valley, Idaho. Large areas in that valley had become breeding spots for the insect. It had been thought that the insect came in from southern Idaho or California, and did not winter in Idaho. Nothing was found to indicate a permanent breeding ground until Snake River was reached. The general migration from Breeding grounds appeared to take place from the 17th. to the 26th. of June. On June 26th. about 5% of the beets were diseased; by the end of two weeks, 50% showed traces of the disease. The development of the disease varied greatly in individual beets. The first indication of the disease is the transparency of the fine veins of the leaf. The date of planting has a direct bearing upon the amount of disease present. Beets planted from April 10-20 averaged 12 tons; from 21-30, 8.83 tons; May 1-10, 7.47 tons; May 11-30, 4.27 tons to the acre. Experiments on different dates of planting showed for early planting 19% loss; late planting 36%, indicating clearly that if the beets were planted early and kept growing rapidly, the disease was less disastrous to the crop.

The location with relation to breeding grounds had a marked effect. The fields nearest to the breeding grounds showed 22% affected; those farther away, 18.37%, and the farthest away only 5%. The disease is carried from season to season in two ways; by plants which give the disease to the leaf hoppers, and by the over-wintering insects which carry it back to the breeding grounds. The over-wintering are all females; the males do not

Mr. A. D. Preston, of the B. B. C. Empire Agricultural Depart-
ment, on "Farm Life in Jamaica" with special reference
to the Possibilities of the "Sunday Top" Scheme. Mr. Preston
was heard upon his arrival in Great Britain (Daily Mirror).

(page). It had been thought that the insect came in from southern
[illegible] of California and had spread in Idaho. Nothing was
found to indicate a permanent breeding ground until August 17th
was reached. The second migration from breeding grounds appeared
to take place from the 17th. to the 26th. of June. On June
[illegible], when 4% or less were heavily infested, 20% showed
[illegible] stages of the disease. The development of the
disease varied greatly in individual beets. The first indication
of any disease is the transparency of the fine veins of the leaf.
The date of planting has a direct bearing upon the amount of dis-
ease present. Beets planted from March 15-30 averaged 11 heavy;
from 30-30, 6.8; from May 1-15, 7.4; from May 15-31, 2.7; from
the 31st. [illegible] no disease. Replacements on diseased plots
for early planting 10% loss; late planting 3%, indicating clearly
that if the beets were planted early and kept growing rapidly,
the disease was less destructive to the crop.

[illegible] was possible to irrigate [illegible] a pronounced
effect. The fields unwatered by the breeding grounds showed 22%
affected; those irrigated, 10.4%, and the [illegible] were only
4%. The disease is carried from season to season in two ways;
by plants with live disease to the leaf hoppers, and by
the over-wintering insects which carry it back to the breeding
grounds. The over-wintering may [illegible] on [illegible]

over-winter. Spray work for this pest is unsatisfactory.

Mr. Claude Wakeland gave a paper on "Control of Eleodes Beetles in Idaho". These insects are not numerous in irrigated sections, but are very injurious on dry land. Experiments made in the fall of 1921 with various mixtures of poison bran mash showed Paris green to be the most effective. Two pounds of Paris green to 25 pounds of bran was used, but half of this amount produced equally good results. Best results were obtained by placing the poisoned mash in a long furrow. Mr. Wakeland cited experiments on four different species of beetles. In carrying on a poison beetle campaign, it was found to be necessary to follow it for two years to secure definite results.

Mr. J. L. Hoerner reported on similar work in Colorado. These beetles are quite injurious in the northeastern part of Colorado in the non-irrigated section. The species of beetle differ somewhat from those in Idaho. Life history studies on seven species are now under way. The furrow method of control was tried out with poisoned bran mash. All species of beetles eat this readily. Paris green gave better results than sodium arsenite in bran mixture.

Mr. Hoerner also spoke on Potato Flea Beetles. In the Greeley district considerable injury has been experienced from the work of this pest. This beetle was first mentioned in 1898 as prevalent on Long Island. Trouble has also been reported in Maine and Vermont. The beetle is common, however, throughout the United States. In 1904 the injury to the crop in Colorado was estimated to be $250,000. The greatest injury is caused by the larvae boring into the potatoes. The beetles eat holes into the potato

Spray work for this pest is unsatisfactory.

Mr. Davis Wakeland gave a paper on "Control of Weeds Pasture in Idaho". These insects are not numerous in irrigated pastures, but may cause injurious on dry land. Experiments made in the fall of 1923 with various mixtures of poisons have shown that a 5% solution of sodium arsenite is the most satisfactory. The amount of arsenic to 25 pounds of bran was used, but half of this amount gave practically equally good results. Best results were obtained by moistening the poisoned mash in a long furrow. Mr. Wakeland cited experiments on four different species of beetles. In carrying on a certain beetle campaign, it was found to be necessary to follow it for two years to secure definite results.

W. A. L. Hoerner reported on similar work in Colorado. Wireworm beetles are quite injurious in the northwestern part of Colorado in the newly-irrigated districts. The species of beetle somewhat from those in Idaho. Life history studies on these species are now under way. The furrow method of control is carried out with poisoned bran mash. All species of beetles are readily killed, while grubs require more poison to kill them.

Mr. Hoerner also spoke on Potato Flea Beetles. In the Greeley district considerable injury has been experienced from the early spring pest. This beetle has first appeared in 1919 on greens until he does injury. Spraying has also been resorted to with and success. Dr. Davis is getting results. Discussion: Mr. Davis: In 1924 the injury to the crop in Gilpin was estimated at 10 to 80%. The potatoes injure the leaves before they are noticed. The beetles are also found in the

varying from 1/2 to 1 3/4 inches, leaving a hole which is replaced by a corky material supplied by the potato, causing a splinter or pit. Sometimes the larvae make a raised placed called a pimple. The adults feed on potato leaves. An experiment was made to see how the tuber would be wasted by the work of the insects. From 12 to 15 per cent of the skin of a potato was pared off as in normal parings and further parings made to get underneath the holes. The loss was surprising and this lowered the rating of the potato as well as reducing its market value.

It was difficult to ascertain the life history of so small an insect, the adult beetles being but 1/16" in size. The beetles fed on potato leaves, changing frequently. The eggs obtained were left on a moistened blotter and allowed to hatch in a small tin box. The larvae were placed in another box and then put on a small piece of potato. The eggs hatch in nine days during June, July and August; in September the time increases to eleven days. Moisture was necessary for hatching. Larval period was 28 or 29 days, with a week for the pupa period. The life cycle, from egg to adult, was from 44 to 50 days. A second generation is possible under Colorado conditions. Eggs were found in the field around potato and tomato plants.

Control measures: Beetles feed on untreated leaves in preference to those sprayed. Various spray mixtures have been tried, including arsenate of lead, arsenate of lead and Bordeaux, and Bordeaux alone. When beetles are caged on sprayed leaves, arsenate of lead seems to stop the egg laying almost immediately and will also poison the beetle slightly. The same is true of

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[illegible] for [illegible]. [illegible]
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[illegible] and [illegible].

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[illegible]. [illegible]
effectively of [illegible] in [illegible]
and [illegible] the [illegible].

Bordeaux and lead to a slight extent. Bordeaux alone did not stop the egg laying as rapidly as the arsenate of lead, or arsenate of lead and Bordeaux combined. The spraying was tried on four cages. The untreated cage produced 685 eggs; that treated with arsenate of lead, 45; Bordeaux and lead, 37. A nicotine dust with lime and sulfur would knock the beetles down, but they revived and laid eggs as freely as beetles not so treated.

The evening program was in charge of Dr. Scott. Mr. Corkins gave an illustrated talk on "The Mormon Cricket", first touching upon the life history, habits, and control of the insect. The first outbreak in the United States was in Utah in 1847, followed by other ravages in Utah and Colorado from 1879 to 1904. The cricket in Moffat county was active in 1921, followed by more vigorous outbreak in 1922. The first outbreaks were unimportant because they were in a cattle country. The insect is a menace in Utah, Wyoming, Idaho, Montana and Colorado.

The insect over-winters in the egg stage. The eggs are deposited singly and are hard to penetrate. The eggs are semi-circular in shape and dark brown in color. Eggs are deposited from the end of June until the middle of July, and then to the middle of August. The eggs are deposited about an inch below the soil surface, being deposited early in the morning. The nymphs hatched are crickets in miniature. The over-wintered eggs commence hatching about the 20th. of April, and the crickets appear as adults the middle of June. The insects eat almost anything, 90% of their food being vegetable. No farm crops are

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[illegible]

immune from attack. They prefer garden crops, especially onions, as their chief diet. They are cannibalistic, eating each other, or eating other species of grasshoppers while they are still alive. If they attack a crop in its early stage of growth, the foliage is completely eaten off. The insects cluster together after sunset. No definite statement can be made regarding the time of feeding except that they feed early in the morning, when they break cluster after they have been warmed by the sun. The period of eating is always relatively short. The migratory instinct is important in this insect. They are very nervous and are in a wave of commotion if disturbed.

When first hatched, the insects are in small local areas, somewhat isolated and covering a patch from 1 to 15 acres in extent. In a large outbreak the area may range from 1/2 mile in width to 6 miles in length.

In 1922 a campaign was put on. Sodium arsenite was substituted for white arsenic. Molasses was omitted from the mixture. Ninety-one per cent of insects were killed without molasses. The results were checked by the cage method. One of the advantages of sodium arsenite over white arsenic is that it is fool proof and soluble in water, is less expensive and easy to handle. The bait was put out when the insects broke cluster, but no definite time could be set. The poisoning had to be done before the crickets took to migrating. In carrying out an effective campaign it is necessary that it be started early in the season and before the insects are half or two-thirds grown. Results were effective while the crickets were young. To arouse active

isolated and covering a patch from 1 to 15 acres in
extent. In a large outbreak the area may range from 1/2 mile
in width by 4 miles in length.

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poisoning for white arsenic.

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The poisoning had to be done
before the crickets took to migrating. In carrying out an effective

interest, each farmer should have some pecuniary interest in the work that is being done. If the campaign is very general, there should be some financial support from the county involved. The 1923 campaign was financed by the American Red Cross, Denver Commercial Association and private individuals. In controlling the insect, birds are of some help. Insect parasites are negative in their aid. Cold weather and snows seem to have very little effect.

Mr. Corkins was followed by Mr. Stuart Lockwood, of the Federal Entomological Bureau in Cereal and Forage work. Mr. Lockwood spoke of work in Utah and urged cooperation in research lines. He mentioned experiments with fermented baits, and stated that several men working to find a bait which would make insect pests feed whether they were hungry or not.

The meeting Saturday morning, August 25th. was in charge of Mr. Claude Wakeland.

Mr. List spoke briefly on General Codling Moth Conditions in Colorado. The fruit grown in Colorado is at altitudes from 3200 to 7600 feet, affording a wide range in climatic conditions, and capable of allowing from one to three generations of insects to mature. The problem of control is difficult as no general recommendations can be made for the entire state. The most unusual condition is in the Grand Valley, the loss there being very heavy. The conditions are more favorable to moth development than to the grower. The infestation in the Grand Valley, even tho the 5 to 8 spray method is used, is greater than in any other section.

have some peculiarity [illegible]
[illegible] it [illegible] "weed"
[illegible] [illegible]
[illegible] [illegible]
[illegible] birds are of some help. Insect parasites are negative
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[illegible] the [illegible]. The [illegible] in the Grand Valley, more
than [illegible] in a valley without [illegible] a longer than in any other
[illegible].

Mr. W. P. Yetter spoke on "Rate of growth of apples in relation to codling moth control." In the measurement of apples, the largest diameter was always used. In his talk Mr. Yetter brought out the rapid increase in skin surface of apple between sprays, the most rapid percentage growth being in the early part of the season, the surface between first and second spraying (at a 9-day interval) increasing 62.84 percent. He emphasized the need for people doing the spraying to realize the amount of skin surface to be sprayed, and that the apple be entirely covered during each spraying. Mr. Yetter showed the growth of the skin surface to be from 2 to 22 square inches during June to September period. The middle of the season it was about 11.67 square inches.

Mr. J. H. Newton spoke on attracting the adult codling moth by the use of "Hootch" cans. He mentioned the different conditions existing in Delta County as opposed to those in the Grand Valley. Delta County has but 1 1/2 broods, while the Grand Valley has 3. The difference in distance is 55 miles and difference in elevation 1100 feet. Ten cans containing 2 parts vinegar and 8 parts water were scattered thru the orchard. Seventy-five males and 125 females were caught from June 2d. to 13. The upper part of the tree was the most favorable for attracting the moths. The vinegar mix was not effective after the first brood.

At first tin cans containing the vinegar solution were used, one to a tree. Afterwards glass jars were used, suspended from the tree by a wire. The traps were easily reached by a 15-foot pole with a hook on its end. The traps were refilled about once a week. The moths were attracted by the odor and thus drawn into the traps. A 10% solution was found to be more effective than a 5%, and no great difference was found between

doing the spraying to realize the amount of skin surface
to be sprayed, and that the apple be entirely covered during each
operation. Mr. Yetter reported on the work in Type 1 on 11 square inches of Elgetmere peanut. The
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The vinegar mix was not effective after the first brood.

solutions ranging from 5 to 75%. The 10% solution, however, was found to be most attractive. A fermented apple juice was shown to catch three times as many moths as the best vinegar solution. The main points brought out were:

Traps placed in upper third of trees more attractive.

Vinegar solution of 10% more attractive other stengths tested.

Fermented apple juice more attractive than vinegar.

Mr. Yetter spoke further upon catching moths by traps. He again made the statement that the Grand Valley district had more moths per tree than any other section of the United States. Climatic conditions were the chief factor, the climate being hot and dry. There were 18 eggs per moth in the first brood, with 38 moths from 2d. and 3d. Experiments showed that twice as many females as males were caught in jars of fermenting apple juice.

Mr. Lockwood again spoke of the necessity of uniform tabulations of experimental results from different states and urged the writers of bulletins to be as consistent as possible in their statements, that the uninformed reader might not jump to hasty and incorrect conclusions. He mentioned several poison solutions effective in controlling insect pests. Many times grasshoppers could be killed by a mixture of bran, arsenic and water. It was questioned whether or not molasses was a beneficial addition to the poison bran mash, as well as whether salt added kept the mixture attractive longer because of the power to draw moisture. Calcium chloride was thought to be better than common table salt. Half bran and half sawdust were equal in

strengths tested.

E. H. Siddall spoke further upon catching moths by traps. He again made the statement that the Grand Valley district had more moths per tree than any other section of the United States. The humidity conditions were the chief factor, the climate being very dry. There were 18 eggs per moth in the first brood, ranging in size from 24. and 34. Experiments showed that twice as many females as males were caught in jars of fermenting apple juice.

[illegible] Lockwood again spoke of the necessity of uniform tabulation of experimental results from different states and urged the adoption of bulletins to be as consistent as possible in their statements, that a uniformed reader might not jump to [illegible] conclusions. [illegible] [illegible] [illegible]

attractive power for about 20 minutes. Bran alone kept its full attractiveness for a full hour. Half bran and half sawdust had proven successful in Canada. In irrigated districts, sawdust was not the proper ingredient for bran mash poison. The work should be done in such a way that one man could take another man's data and use the same figures, either proving or disproving the results.

Mr. List ended the final session with appreciative comments on the papers of the visitors present and said the Colorado delegates felt amply repaid for their efforts in making the meeting a success. Dr. Smith invited any of themen who might pass through Manhattan to stop off there. Mr. Lockwood mentioned the entomological meeting to be held in Bozeman in April, 1924. The meeting then adjourned.

The minutes would be incomplete without special mention of the entertainment committee who served each evening and added so much to the pleasure of the guests. Mr. Harold Jones was a most efficient "K.P." contributing greatly to the comfort of the "inner man" by his quiet service.

The committees for judging the various contests of the week made the following selections as winners:

Trout fishing. - A. C. Maxson, first prize; A. L. Lovett, booby prize.

Horseshoe Pitching Contest - Men's singles, J. L. Hoerner champion. Men's doubles, Colorado 1st, Wyoming 2d.

Ladies' singles, Miss McDonald, winner.

Dr. Carl J. Drake was pronounced chamion "bug" catcher.

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bran mash poison. The work should

session with appreciative comments

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evening and added

first prize; A. L. Lovett,

- Men's singles, J. L. Hosmer

Report of Committee on Resolutions.

We, the entomologists in the Rocky Mountain Conference assembled, desire to express our congratulations to the Colorado Agricultural College, and to the Department of Entomology, for the development of the idea of a Rocky Mountain conference of entomologists and for the excellent manner in which arrangements for this conference have been carried out.

We desire to express our appreciation to the Colorado State Board of Agriculture, to the Colorado Agricultural College, and to Professor W. J. Morrill, of the Department of Forestry, for the use of the lodge at Pingree Park.

We wish to express our particular appreciation to Professors C. R. Jones and G. M. List, of the Department of Entomology of the Colorado Agricultural College, for their splendid provision for our comfort and entertainment in Pingree Park.

To Doctor C. P. Gillette, temporarily in California, we extend greetings. We desire to express our keen disappointment that the conference has had to forego his presence and counsel at its sessions, and we trust that the illness that prevents his attendance will be of short duration.

Your committee recommends to this body assembled that the Rocky Mountain conference of entomologists be made an annual event. It further recommends that the conference be informal in nature, and that a chairman and a secterary be elected by this body to carry out arrangements for a second meeting.

Signed { A. L. Lovett
R. L. Webster
W. H. Wellhouse

Report of Committee on Resolutions.

Mr. President and Members of the Rocky Mountain Conference of Entomologists:

Your Committee on Resolutions begs leave to submit the following:

Be it resolved that the Rocky Mountain Conference of Entomologists express our appreciation to the Colorado State Board of Agriculture, to the Colorado Agricultural College, and to Professor E. A. Carlyle, of the Department of Forestry, for the use of the Lodge on Pingree Park.

We wish to express our particular appreciation to Professors C. P. Gillette and G. M. List, of the Department of Entomology of the Colorado Agricultural College, for their splendid provision for our comfort and entertainment in Pingree Park.

To Doctor C. P. Gillette, temporarily in California, we extend greetings. We desire to express our keen disappointment that the conference had to forego his presence and counsel at its sessions, and we trust that the illness that prevents his attendance will be of short duration.

Your Committee recommends to this Rocky Mountain Conference of Entomologists be sent to absent members. It further recommends that the secretary be instructed to extend to each of them a message of sympathy in their illness and assurance that we shall be glad to have them with us at a second meeting.

Signed { C. L. Marsh
J. D. Webster
H. H. Wellhouse

Copy of Telegram

C. P. Gillette
2249 Lawrence Street, c/o Dale Smith
Point Loma, Calif.

Greetings from Rocky Mountain Conference of Entomologists assembled at Pingree Park. Conference proving complete success. Permanent organization formed, Gillette chairman, Swenk Vice, List secretary. Expression of regret for your absence included in resolutions and best wishes extended for pleasant vacation.

Night letter sent from
Fort Collins, August 24.

Copy of Telegram

C. P. Gillette
2249 Lawrence Street, c/o Dale Smith
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